

# City of Globe, Arizona

## Addendum #3

### 5-24-16

1. In section 2.1.B of the specification the specified product is a Sherwin Williams product but it does not state or equal like the exterior system states in 2.2.C. My question is since this is a public project will a equal be allowed on the project as long as it meets or exceeds the requirements in the specification?

Answer: The contractor may always submit or equal products for review by the Engineer/Project Manager.

I have a customer bidding on the project that uses Carboline on a lot of the water tanks they do and would like to bid the project using Carboline products.

Answer: Without more information, the City cannot pre approve an alternate product at this time.

2. Do we need prior approval or is this something that will be done after the job is awarded in the submittal process?

Answer: The contractor may always submit or equal products for review by the Engineer/Project Manager.

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1. What is the address of each tank? The City does not have specific addresses for each tank.
  2. Do you know if any of the tanks have lead? If yes, any test results? Crestline and other tanks owned by the City have been tested and have been found to be lead free. The Thompson and Apache Peaks tanks have not been tested for lead.
  3. Is there work hour restrictions or LD's to conform to? Normal Business Hours and Liquidated Damages apply per the contract documents.
  4. Is this project "tax exempt"? No
  5. Is the exterior primer a SPOT PRIME or a FULL PRIME? Please see response below.
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Follow up information on exterior coating:

#### Exterior SCOPE:

- Per the spec – perform lead test to confirm if lead is present or not. This applies to the small tanks only, as the Crestline tank has been tested and does not have lead.
  - If present SSPC-SP Guide 6 and 7 become effective along with OSHA criteria for worker safety
- Pressure wash all exterior areas with min 3,000 psi until oxidized coating is removed per the Manufacturer data sheet. Additional cleaning/scrubbing maybe required.
- Spot prep all areas of coating failure and rusting to an SSPC-SP 2 or 3, feather back all edges to tightly adhered coating
- Prime all spot prepped areas with surface tolerant epoxy as per spec. (in this case Sherwin Williams Macropoxy 646 was recommended)
- Pole sand all exterior areas
- Wipe down/blow down all exterior areas
- Coat all exteriors areas with 1 coat of epoxy, Sherwin Williams Macropoxy 646 per the spec . (in this case Sherwin Williams was recommended)
- Coat all exterior areas with 1 coat of Urethane, Sherwin Williams Hi-Solids Polyurethane per the spec. (in this

case Sherwin Williams was recommended)

Exterior SCOPE for newly installed Steel:

- SSPC-SP 6 “commercial Blast” all newly installed steel
- Wipe down/blow down blasted surfaces exterior areas
- Coat all exteriors areas with 1 coat of epoxy, Sherwin Williams Macropoxy 646 (in this case Sherwin Williams was recommended)
- Coat all exterior areas with 1 coat of Urethane, Sherwin Williams Hi-Solids Polyurethane (in this case Sherwin Williams was recommended)

# **CATHODIC PROTECTION SPECIFICATION**

## ***AUTOMATICALLY CONTROLLED IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM FOR THE INTERIOR OF STEEL WATER TANKS (VERTICAL ANODE SYSTEM)***

**A. SCOPE** The cathodic protection design/install constructor shall provide all engineering services, materials, equipment, labor, and supervision for the installation of an automatically controlled impressed current cathodic protection system to provide corrosion control for the interior submerged surface of the specified tank. All work furnished shall be in accordance with A.W.W.A. and N.A.C.E. standards for Internal Cathodic Protection of water storage tanks.

### **B. DESIGN**

All engineering services shall be provided by a Corrosion Specialist who is accredited by the National Association of Corrosion Engineers International as a Senior Corrosion Technologist, Corrosion Specialist or Cathodic Protection Specialist. The system shall be designed by a Corrosion Specialist with experience in cathodic protection for water storage tanks. The Corrosion Specialist shall design the system to provide effective corrosion control in accordance with criteria for protection. The criteria for protection shall be based on a tank-to-water potential, IR drop free, within a range of -0.850 volts to -1.050 volts relative to a stationary copper-copper sulfate reference electrode. This potential shall be measured free of the effect of voltage gradients (IR drop).

The Corrosion Specialist shall also base system capacity and performance on:

1. Total submerged surface area of the tank.
2. Type of coating and condition of coating.
3. Total bare surface area to be protected will be a minimum of 20% of total surface area.
4. Minimum current density of 0.5 MA/ft.<sup>2</sup> bare surface area.
5. Chemical analysis of water including resistivity expressed in ohm-cm.
6. Susceptibility of tank to icing conditions.
7. Minimum anode design life of twenty (20) years.
8. Selection, dimensions, and layout of system components specified in Section C. of this specification.

## **C. SYSTEM COMPONENTS**

### **C1. RECTIFIER**

The rectifier unit shall perform in accordance with ANSI/AWWA Standard D104-04 IR Drop Free control standards and shall include:

1. Transformer
2. Silicon rectifying elements
3. Circuit breaker(s)
4. Lightning, surge, and overload protection
5. Provision for air-cooling operation
6. Digital voltmeter(s), ammeter(s) and potential meter(s)
7. Weatherproof cabinet in accordance with NEMA 4 requirements
8. Provision to vary current output from 0% to 100% of rated capacity
9. Provisions for mounting, grounding, and locking
10. Provision for 110-120 volt, 60 Hz, single phase A.C. power.
11. D.C. output capacity in volts and amperes in accordance with Design (Section B)
12. Number of circuits in accordance with Design (Section B)
13. Automatic controller shall adjust current output to compensate for changes in water level, temperature of water, water chemistry, and cathodic polarization, and shall include the following provisions:
  - a. Utilize long-life reference electrode(s) installed within the tank
  - b. Monitor the tank-to-water potential, free of IR drop
  - c. Automatically adjust the tank-to-water potential, free of IR drop, to a preset value
  - d. Operate within 5MV of preset value
  - e. Limit current to a preset value
  - f. Utilize digital potential meter(s) to display tank-to-water potential, free of IR drop

### **C2. LONG LIFE REFERENCE ELECTRODE(S)**

The permanent reference electrode shall consist of a copper-copper sulfate electrode which is manufactured to remain stable (plus or minus 10MV) for minimum of ten (10) years. The reference electrode to lead wire connection shall be encapsulated to prevent water migration with not less than AWG NO. 14 HMW-PE lead wire. The stationary reference electrode shall be positioned within the tank to provide the most representative measurements for the submerged surface area(s).

**C3**     **VERTICAL ANODE SUSPENSION SYSTEM**

The anode suspension system shall be in accordance with AWWA Standard D104, Section 4.2.4.2.2 Type C, Vertical System. The anode lead wire for vertical suspension shall be attached to a porcelain insulator bracket bolted to the interior of the tank roof. Handhole assemblies used for the installation of vertical anode suspension systems from the roof of the tank shall consist of a 6" diameter cover, rubber gasket, and a clamping bar with a stainless steel bolt assembly for each 5" diameter access opening.

**C4**     **ANODE MATERIALS**

The anode materials shall be selected in accordance with Design (Section B) and shall consist of the following:

- 1        Minimum .062" diameter 127mA titanium with a mixed metal oxide coating.

**C5**     **WIRING**

All wiring within the tank shall be insulated to prevent copper conductor to water contact.

All wiring on the exterior of the tank shall be insulated and run in rigid galvanized conduit.

**C6**     **HARDWARE** All hardware used in conjunction with the system shall be protected against corrosion.

**D**       **SUBMITTALS**

The cathodic protection constructor shall submit the following information to the purchaser for approval by the Owner or his representative.

1.       Drawings showing system design/configuration.
2.       Description of system components.
3.       Design calculations for required voltage, amperage & life expectancy.

**E. WORKMANSHIP AND INSTALLATION**

**E1. QUALIFICATIONS**

The cathodic protection constructor shall have a minimum of five (5) years experience installing and servicing the types of systems described in this specification. The system shall be installed by personnel specifically trained by the constructor to provide all workmanship required for corrosion control performance. All personnel shall be subject to Federal Substance Abuse and Testing Regulations.

## **E2. PERFORMANCE**

All work shall be in accordance with the following requirements:

1. Components of the cathodic protection system shall be installed in the manner and at the locations as shown on the design drawings prepared by the Corrosion Specialist.
2. Welding, cutting, and coating shall be in accordance w/AWWA Standards D100, D102 & D105
3. Welding of rectifier hardware shall be performed by the prime contractor prior to coating the tank. The cutting of 5" diameter access openings for vertical anode suspension shall be performed by the prime contractor prior to coating. The cathodic protection constructor shall furnish drawings and materials to the prime contractor prior to coating.
4. Verification of electrical continuity of all sections of bolted or riveted tanks shall be the responsibility of the purchaser of the cathodic protection system.
5. Materials and equipment shall be inspected prior to installation. Any defective component shall be repaired or replaced.
6. Electrical work shall be in accordance with the National Electrical Code.
7. Lead wires shall be installed to prevent damage from abrasion.
8. Electrical connections within the tank shall be sealed to prevent water migration.
9. The rectifier shall be mounted at a convenient height (eye level) above grade for monitoring and service purposes.
10. A.C. power to the rectifier shall be furnished by the purchaser.
11. Disinfection of the tank shall be the responsibility of the purchaser.
12. Work provided by the constructor shall be completed in a clean and safe manner.

## **F. ENERGIZING THE SYSTEM**

After the system is installed and the tank is filled, the cathodic protection constructor shall provide start-up service which includes energizing, testing, and adjusting the system for optimum performance of the cathodic protection system. This start-up service shall be performed in accordance with ANSI/AWWA D104 Section 5.2 Testing. This start-up service shall be coordinated with the Owner or his representative. All tank-to-water potential measurements shall be conducted with a calibrated portable copper-copper sulfate reference electrode and a portable high impedance voltmeter. A minimum of five (5) locations shall be measured. All test data shall be reviewed and evaluated by the Corrosion Specialist.

## **G. SERVICE AGREEMENT**

At the conclusion of the warranty period, the cathodic protection constructor shall furnish a service agreement to the owner for the type of system installed. The agreement shall include the annual service rate and a complete description of the scope of work proposed. The agreement for annual inspection and potential testing shall be in accordance with AWWA D104, Appendix C and include as a minimum:

1. One (1) annual job site visit.
2. Tank-to-water potential measurements conducted at representative locations within the tank. A minimum of five (5) locations shall be measured.
3. Measurements shall be conducted with a portable high impedance voltmeter and a calibrated copper-copper sulfate reference electrode.
4. Adjustments for optimum corrosion control shall be in accordance with criteria for protection.
5. Data recorded shall provide sufficient information to evaluate the performance for the system relating to criteria for protection.

In the event additional work is required, the constructor shall submit a report with recommendations for optimizing corrosion con

**SOLICITATION TYPE:  
COMMODITY/SERVICE SOUGHT:**

**INVITATION FOR BIDS  
Rehabilitation and Protective Coating for the  
1.0 Million Gallon Crestline Water Storage  
Tank. Rehabilitation and Protective Coating for  
the 0.04 Million Gallon Thompson Water  
Storage Tank. Rehabilitation and Protective  
Coating for the 0.05 Million Gallon Apache  
Peak Water Storage Tank.**

**BID DUE DATE AND TIME:  
LOCATION:**

**Date May 27, 2016 at 2:00 PM local time  
City of Globe  
Joseph Jarvis, MPA  
Finance Director  
150 N. Pine St.  
Globe, AZ 85501  
928-425-7146 ext.11  
[jjarvis@globeaz.gov](mailto:jjarvis@globeaz.gov)**